Dairy Beef Systems Update

Teagasc, Johnstown Castle Research Centre
7th July, 2011

Teagasc
Agriculture and Food Development Authority

DAWN MEATS

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Dairy Calf to Beef Research at Johnstown Castle

Robert Prendiville[1], Rioch Fox[2] and Brendan Swan[2]

[1]Teagasc, Animal & Grassland Research and Innovation Centre, Grange, Co. Meath (based at Johnstown Castle); [2]Teagasc, Animal & Grassland Research and Innovation Centre, Johnstown Castle, Wexford.

Summary

- The objective of this joint programme between Teagasc and Dawn Meats is to develop systems of production resulting in a product that is profitable to the producer and marketable for the processor.
- Results from the first phase of this research indicate that all production systems evaluated to date are highly sensitive to concentrate input price.
- Further research is being initiated to explore avenues of reducing costs within these systems.

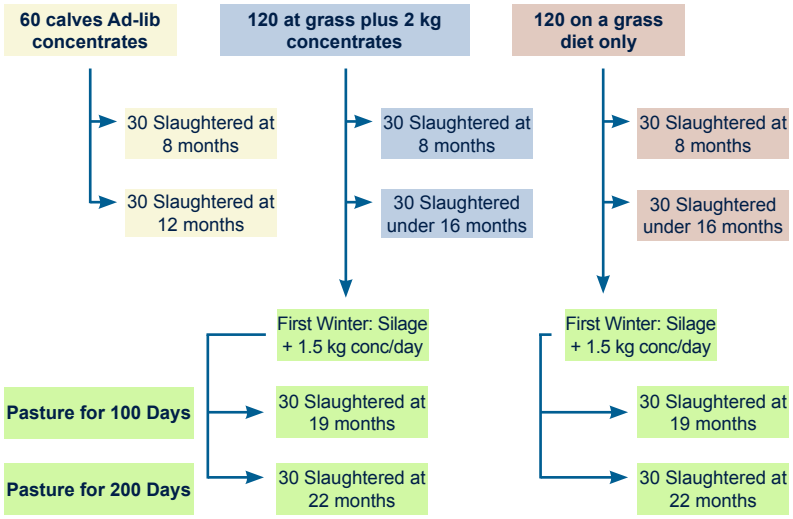
Introduction

The impending abolition of milk quotas in 2015 is expected to prompt significant expansion in the national dairy herd. Hence, a substantial increase in the supply of dairy bull calves is anticipated. Defining blueprints for dairy beef production systems is critical to profit generation from dairy calf to beef systems. With this in mind, the dairy calf to beef programme was established in Johnstown Castle in 2010 for the purposes of research and demonstration to Irish dairy beef producers. The objective of this joint programme between Teagasc and Dawn Meats is to develop systems of production resulting in a product that is profitable to the producer and marketable for the processor.

Production systems

In 2010, 300 spring born calves were assembled at the Johnstown Castle research farm. Sixty calves were immediately housed on a diet of meal ad-libitum with straw as a source of roughage. The remaining 240 claves were turned out to pasture; half of these were offered 2 kg of concentrate per calf per day with the remaining 120 calves on a pasture only diet. The objective of these production systems was to ascertain the maximum growth potential as well as the lifetime effect of concentrate supplementation for the first season at pasture. The concentrate offered contained 80 per cent barley, 14 per cent soya, 4 per cent molasses and 2 per cent minerals. Each treatment group was made up of 18 Holstein-Friesians (HF) and 12 crossbred calves (primarily Jersey×Holstein-Friesian with a small number of Norwegian Red × Jersey×Holstein-Friesian. These are denoted as JEX.

Figure 1: *Production systems for dairy calf to beef production investigated at Johnstown Castle.*



Eight month system

Animals were slaughtered at eight months to develop carcass profiles and also investigate the potential of this system for niche markets. Three groups (90 calves) were finished just under eight months of age, 30 calves from each treatment: calves on ad lib concentrates indoors, calves at pasture plus 2 kg concentrate and calves on pasture only.

Live weight, average daily gain and slaughter data for the three systems are presented in Table 1. Live weight and average daily gains were highest with the calves indoors on ad-libitum concentrate, intermediate with the calves supplemented at pasture and lowest with calves on the pasture only diet. Carcass weight followed a similar trend. Kill out proportion was 474 g/kg, 460 g/kg and 410 g/kg for the calves indoors on ad-libitum concentrate, calves supplemented at pasture and pasture only calves, respectively. Comparative production and slaughter performance between the HF and JEX is also presented. Estimates of individual intake for the HF and JEX calves indoors were 808 kg and 724 kg, respectively. A difference of 11 kg carcass weight was observed between the Holstein-Friesian and Jersey× Holstein-Friesian in the ad-libitum feeding system. Carcass conformation was predominately ‘O’ for the calves indoors on meal ad-libitum and ‘P’ for the calves at pasture. It should be noted that animal performance was below target due to a disease outbreak in 2010.

Table 1: *Treatment and breed effect on the performance of dairy bull calves slaughtered at less than eight month.*

Treatments	Ad-lib		Pasture + 2 kg		Pasture	
Live weight (kg):						
Start	85		85		85	
Slaughter	264		206		149	
ADG (kg/d)	1.19		0.83		0.45	
Carcass weight (kg)	126		96		61	
Kill out (g/kg)	474		460		410	
Breed Groups	**HF**	**JEX**	**HF**	**JEX**	**HF**	**JEX**
Live weight (kg)	275	252	223	195	164	143
ADG (kg/d)	1.25	1.12	0.86	0.77	0.48	0.43
Carcass weight (kg)	133	119	107	87	68	57
Kill out (g/kg)	481	469	476	446	418	403

Twelve month system

Of the 60 animals which were housed and offered meal ad-libitum the remaining 30 were slaughtered at 12 months of age thus providing data for a further four months intensive finishing. Animals were housed on slatted floors and grouped according to breed type. They remained on the same diet from May until slaughter. Concentrate input was 1.8 t for the HF and 1.65 t for the JEX. Live weight, average daily gain, carcass weight and kill out proportion were greater for the HF compared to the JEX (Table 2). Carcass conformation for both breeds were predominately 'O' with carcass fat classes of 2.

Table 2: *Production performance of Holstein-Friesian and Jersey × Holstein-Friesian calves slaughtered less than 12 months.*

	Holstein-Friesian	Jersey x Holstein-Friesian
Live weight (kg):		
Beginning of experiment	91	75
Slaughter	427	363
ADG (kg/d)	1.28	1.13
Carcass weight (kg)	217	177
Kill out (g/kg)	508	487

Under 16 month system

Of the 120 animals which were each allocated to the pasture only and pasture + 2 kg treatments during the first grazing season, a further 30 of each were slaughtered under 16 months of age. This production system reflects market requirements. Total concentrate input was 310 kg DM/ calf for the calves that were supplemented for the first grazing season. All animals were housed on November 12th. These animals were then built up onto an ad-libitum diet over a 3 week period. All groups received the same concentrate mix with straw used as a source of roughage. Animals were on ad-libitum meal for 197 days and slaughtered according to age in May and June 2011. Total concentrate input during the finishing period was 1.86 t for bulls that received 2 kg of meal at pasture as calves and 1.75 t for bulls that were on pasture only as calves for the first season. Live weights, average daily gains, carcass weights and kill out proportions of these groups are presented in Table 3. Comparative performance between the HF and JEX is also presented. Carcass conformation was predominately 'O' with a fat class of 2= and 2+. No difference in fat class was observed between the two systems. Differences between breed groups indicate similar performance between the HF and JEX at pasture. However, during the finishing period HF have a higher average daily gain, greater carcass weights and higher kill out proportions compared to the JEX.

Table 3: *Treatment and breed effect on the performance of dairy bulls slaughtered at less than 16 months.*

First Season	**Pasture + 2 kg**		**Pasture**	
Live weight (kg):				
Housing	239		188	
Slaughter	491		442	
ADG (kg/d)	1.30		1.31	
Carcass weight (kg)	247		228	
Kill out (g/kg)	528		515	
	HF	**JEX**	**HF**	**JEX**
Live weight (kg):				
Housing	240	241	189	185
Slaughter	500	448	458	416
ADG (kg/d)	1.31	1.18	1.35	1.19
Carcass weight (kg)	264	230	241	214
Kill out (g/kg)	529	513	526	514

Nineteen and twenty-two month system

The remaining bulls were housed in November according to their treatment groups in an effort to reduce the incidence of bulls fighting during the second season at pasture. These bulls were offered silage ad-libitum (73 DMD) with 1.5 kg of concentrate per bull over the winter period (November 12th to March 3rd). Total concentrate supplementation during the winter period was 165 kg per bull. Average daily gain during the winter period was 0.71 kg/day for the animals that were on a pasture only diet for the first season at pasture. Corresponding ADG were 0.81 kg/day for the animals that were allocated 2 kg/day for the first season. All of the groups were turned out to pasture for the second season on March 3rd. Bulls were allocated fresh pasture every 24 hours. Group sizes of 25-30 were maintained and groups never grazed in paddocks beside each other.

Average daily gains for the 19 month animals at pasture were 0.80 and 1.03 kg/day for the animals supplemented at pasture for the first season and pasture only groups, respectively. The bulls in the 19 month system were housed in June and are being given a fixed 100 day finishing period on ad-libitum meal. Bulls in the 22 month system will be housed in September and given a 100 day finishing period on meal ad-libitum. Slaughter data is as of yet unavailable for these animals.

Summary

Results from the first phase of this research indicate that all production systems evaluated to date are highly sensitive to concentrate input price.

Research developments 2011

In 2011, more emphasis is being placed on the comparison between less than 16 month production systems, 19 month production systems and the conventional 24 month steer system. Over the course of May 2011, 300 calves were assembled at the Johnstown Castle unit. Twelve treatment groups were established. Each treatment group consists of 25 animals; 15 Holstein-Friesians, six Jersey× Holstein-Friesians and four 3-way crossbred animals (Norwegian Red bull × Jersey crossbred cow). The finishing systems are detailed in Figure 2. All calves are receiving meal at pasture. Throughout the grazing season 150 calves will be given 2 kg of concentrate supplementation per day with the remaining 150 calves receiving 1 kg/head/day.

All animals will be housed in November. Six groups of bulls will be slaughtered less than 16 months of age. Due to the intensive ad-libitum feeding systems operated in 2010, alternative finishing strategies are now being investigated.

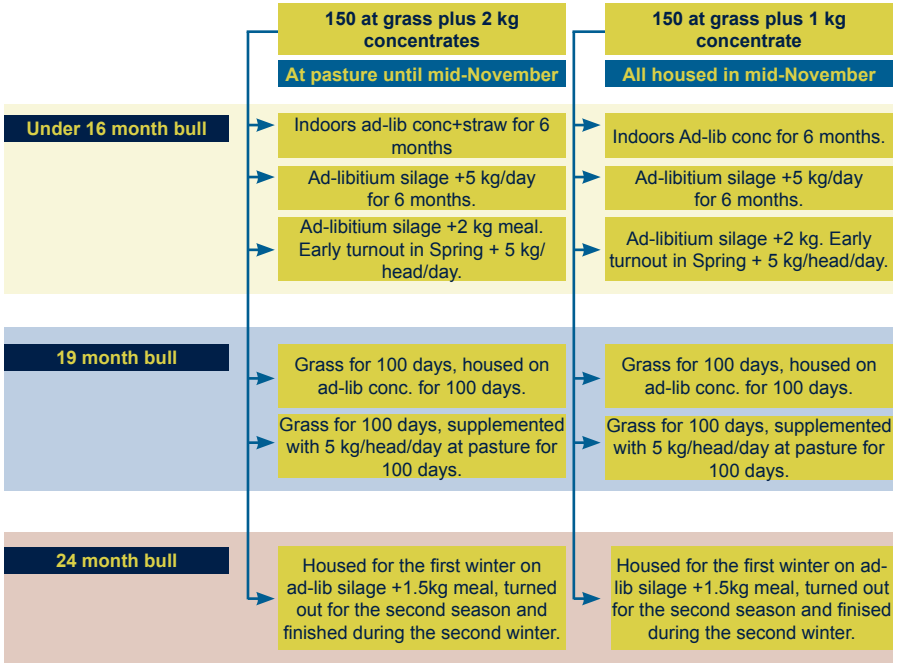
Two groups will be housed on a diet of good quality ad-libitum silage plus 5 kg of concentrate. The remaining groups in the under 16 month production system will be turned out to pasture in late February/ early March and supplemented with 5 kg of concentrate.

The animals in the 19 month production system and 24 month steer system will be housed on ad-libitum silage with 1.5 kg of concentrate supplementation and turned out to pasture in early spring. Two groups will be turned out to pasture for 100 days, housed in June and given a 100 day finishing period. The remaining groups in the 19 month production system will be allocated 5 kg of concentrate per day at pasture for 100 days. These groups will be slaughtered in September 2012. The animals in the steer system will remain at pasture for the second grazing season and will be finished during the second winter.

Autumn bulls

Autumn born animals represent 10 per cent of the total of dairy born animals. Typically, these autumn born bull calves are finished as steers at the end of the second grazing. The merit of leaving these animals as bulls and finishing them at 16 months of age is currently being investigated at Johnstown Castle. A total of 43 bulls obtained from the Johnstown Castle dairy herd were turned out to pasture on March 18th with an average live weight of 160 kg. Animals received 1 kg per head for the first 40 days at pasture. These animals will be housed in October, built up to an ad-libitum diet and slaughtered at 16 months of age. A target live weight of 340 kg is set for these bulls at housing.

Figure 2: *Finishing treatments of the dairy calf to beef system at Johnstown Castle 2011.*



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Systems of production for male calves from the dairy herd

Robert Prendiville[1], Pearse Kelly[2] and E.G. O'Riordan

[1]Teagasc, Animal & Grassland Research and Innovation Centre, Teagasc, Grange, Co. Meath; [2]Teagasc, Kildalton College, Piltown, Co. Kilkenny.

Summary

- The main systems currently available for beef production from male dairy calves include: rosé veal (less than 12 months), 15, 19 and 22 month bull systems, and the conventional 24 month steer system.
- Inputs and animal performance in rosé veal production systems are predictable and repeatable. Typically, carcass weights range between 200 and 220 kg.
- Market demands dictate that young bulls are slaughtered at less than 16 months of age with a 275 kg carcass.
- Currently the majority of bull beef is produced from the 19 and 22 month systems. While these systems do utilise pasture in the second grazing season market demands dictate that, from a meat quality perspective, an upper age limit of 15 months is suitable for young bulls.
- Irrespective of production system, the economics of production is sensitive to calf purchase price, concentrate costs and selling price.

Introduction

With the abolition of milk quotas in 2015 and the likely expansion in the national dairy herd it is forecast that there will be a substantial increase in the supply of dairy bull calves. Developing beef production systems, in Ireland, to make greater use of these male dairy calves would make an important contribution to the economy. Finding the most suitable beef production systems for these male dairy calves is a challenge for the industry resulting in renewed interest in bull beef production as an alternative for these calves. Before decoupling of support premia, bull beef production was generally less profitable than well managed steer beef, partly because of the higher premium earning capacity of steers. Rearing males as bulls has inherent efficiencies due to improved feed conversion efficiency and growth rate. There are many systems of beef production for male calves from the dairy herd; rosé veal (less than 12 months), 15, 19 and 22 month bull systems, and the conventional 24 month steer system. Irrespective of production system, the economics of production is dependent on calf purchase price, concentrate costs and selling price.

Under twelve month bull production system

The less than 12 month system of bull beef production is based on the production of rosé veal. Dairy bull calves are reared in conventional calf

rearing units. Intakes of ration are increased to ad-libitum with straw as a source of roughage. Animals are kept indoors through to slaughter and slaughtered at less than 12 months of age. Carcass weights range between 200 and 220 kg and a finishing price/kilogram of carcass weight should be agreed before the finishing period. The advantages of this system are that large numbers of bull calves can be finished once there is housing available to accommodate them. Typically, concentrate input is 1.8 t. Inputs and animal performance in ad-libitum concentrate systems are predictable and repeatable. However, this is a very intensive system and is most sensitive to changes in calf purchase price, concentrate price and sale price.

Under sixteen month bull production system

Market demands dictate that young bulls should be slaughtered at less than 16 months of age. In this system calves are turned out to pasture for the first grazing season. Animals are then housed in late October/early November and finished on good quality silage plus concentrates or ad-libitum concentrates with a limited proportion of roughage. If silage is not of optimum quality, ad-libitum concentrates should be fed. Concentrate input in ad-libitum systems is 1.8 t. Finishing animals' ad-libitum will increase finishing costs and consequently reduce farm profit. Carcass specification requires bulls in this system to achieve carcass weights greater than 270 kg.

Nineteen and twenty-two month bull production systems

Management and performance for the first season at pasture is the same as described for the under 16 month bull system. These systems are less intensive than young bull systems and facilitate good average daily gains at pasture in the second season provided pasture is of adequate quality. In these systems animals are turned out to grass for the first summer and housed in mid-November. Animals are offered ad-libitum silage plus a limited proportion of concentrates (1.5 to 2 kg/day). They are then turned out to pasture again in late February/early March. Bulls in the 19 month system are turned out to pasture for a 100 day period and are housed in late May/early June. The animals are then finished on ad-libitum concentrates for a 100 day period. These bulls are slaughtered in September/October. In this system carcass weights of 300 kg should be achieved.

Bulls in the 22 month system are turned out to pasture for a 6 month period and are housed in September. Animals are then housed and finished on ad-libitum concentrates for a 100 day period and are slaughtered in November/December. In this system carcass weights of 320 kg can be achieved. Total concentrate input in these systems is about 1.4 t/bull excluding calf rearing.

At present the 19 and 22 month bull systems are the more common systems of bull beef production. However, they are considered an unattractive product from a meat quality perspective. Older animals produce tougher meat and market demands deem an upper age limit of 15 months suitable for bulls. Research is on-going to see if this holds true.

Twenty four month steer system

The inputs and performances associated with finishing Holstein-Friesians as steers at 24 months of age have been well documented. Typically, animals spend two summers at grass and are finished in the second winter. Concentrate input is around 1 t/animal. Typical target live weights for the system are 230 kg at first housing, 300 kg at turnout in spring and 490 kg at housing at the one and a half year-old stage. Lifetime daily gain (birth to slaughter) will be around 0.8 kg/day. Growth rate for weanlings is normally about 0.5-0.6 kg/day during their first winter and this is done to lower production costs and to optimise subsequent performance at pasture (compensatory growth). Most finishing systems are based on a final finishing period in which 120 to 140 kg of live weight gain are achieved by feeding either good quality grass silage with 4-5 kg of meal or ad-libitum concentrates plus roughage. Live weight at slaughter for Holstein-Friesian steers is 620 kg with a 320 kg carcass (kill out proportion of 515 g/kg). Typical carcasses will grade 80 per cent O's and 20 per cent P's and the fat scores of three's and four's.

Autumn born animals

Autumn born animals represent 10 per cent of the total of dairy born animals. These animals can be finished as steers at the end of the second grazing. Concentrate supplementation is about 150 kg for the first winter and calves are turned out to pasture for the first season in early spring at around 160 kg live weight. Total concentrate input at pasture is about 110 kg (for the first 6 weeks in spring and six weeks in the autumn before housing). Target average daily liveweight gains at pasture of 0.80 to 0.85 kg/day should be achieved with a target body weight of 340 kg at housing. Animals are carried over the winter on a limited proportion of concentrates (1.5 to 2 kg/day) with silage ad-libitum. Average daily gain over the winter period is 0.6-0.7 kg/day. Animals are turned out to pasture for the second grazing season at a target body weight of 425 kg with an average daily liveweight gain of 0.85 to 0.90 kg/day to mid-August. Concentrate supplementation is introduced for the final 2 months at pasture and animals are slaughtered in mid-October. The target weights outlined in the 24 month steer system of 620 kg body weight and 320 kg carcass weight should be achieved. The potential for slaughtering autumn born calves as bulls is currently being evaluated.

Economics of dairy beef production systems

Paul Crosson and Edward O'Riordan
Teagasc, Animal & Grassland Research and Innovation Centre, Grange, Co. Meath

Summary

- Projected increases in dairy cow numbers will increase the number of calves becoming available for beef production.
- There has also been an increase in interest in bull finishing systems due to the greater growth potential of bulls relative to steers.
- A number of alternative dairy calf-to-beef systems were compared in terms of financial performance.
- In terms of profitability, systems were ranked as follows from most to least profitable; 22 month bull finishing, 24 month steer finishing, 19 month bull finishing, 8 month veal finishing, under 16 month bull finishing and 12 month bull finishing.
- All systems were highly sensitive to calf, concentrate and beef price and thus, the careful preparation of production system budgets is recommended.

Introduction

With the impending abolition of milk quotas in 2015, it is projected that dairy cow numbers in Ireland will increase substantially. This will result in a greater number of dairy male calves becoming available for beef production. Although the majority of beef cattle from the dairy herd are currently finished as steers, there is increasing interest in bull finishing systems given the inherent greater live weight gain performance of bulls relative to steers. However, these systems have typically involved greater levels of concentrate feeding than steer systems. The objective of this paper is to examine the economics of a range of options for finishing male calves from the dairy herd. These systems are based on the systems currently under evaluation in the Johnstown Castle dairy calf-to-beef project. Six options were evaluated representing calf-to-beef systems finishing male calves as; veal at 8 months of age, bull beef at 12, 16, 19 and 22 months of age and steer beef at 24 months of age.

Veal finishing systems

Veal finishing systems using Friesian and Jersey crossbred calves were evaluated. In this system calves were finished on ad libitum concentrate diets with straw offered as a source of roughage following a 12 week rearing phase. Live weight gain was lower for the Jersey crossbred calves resulting in a 20 kg differential in slaughter weight and a 14 kg differential in carcass weight in favour of the Friesian calves (Table 1). Approximately

750 kg of concentrates were fed per head. For the financial analysis of the other systems evaluated, cost and price assumptions were based on those prevailing for the Johnstown Castle dairy calf-to-beef project in 2011. Jersey crossbred calves were purchased at €30/head with Friesian calves costing €140/head. Fixed asset requirements were assumed to consist of a calf house and a weanling finishing unit. Both of these were assumed to be in the seventh year of a 20-year life span with interest charged at seven per cent per annum. A similar approach was taken for the remaining production systems evaluated in this paper with finishing housing costs reflecting age and weight at finish. Both Friesian and Jersey crossbred calves returned a positive net margin (Table 1). Systems based on Jersey crossbred calves were somewhat more profitable largely owing to lower calf purchase price and lower concentrate feed requirements. Sensitivity analysis indicated that both systems are very sensitive to calf price and veal price in particular.

Twelve month bull finishing system

The 12 month bull finishing system and the remaining beef systems evaluated in this paper, had a similar rearing phase to the veal production system. Following the rearing phase calves were built up onto ad libitum concentrate with straw offered as a source of roughage. Similar to the veal production system, live weight gain was greater for the Friesian compared to the Jersey crossbred calves such that slaughter weight was 64 kg greater and carcass weight was 40 kg greater for the Friesian bulls. Correspondingly, concentrate consumption was greater for the Friesians. Neither system returned a positive net margin (Table 2). However, gross margin was positive for both systems indicating that a contribution can be made to the fixed costs of the farm. In addition to calf price and beef price, the 12 month bull system is also sensitive to concentrate price.

Under 16 month bull finishing systems

For the under 16 month bull finishing system, calves were turned out to pasture in May at approximately three months of age for a six month grazing season. Two treatments were compared; supplementing at pasture with 2 kg of concentrate (PC) or offering no supplementation during the grazing season (PO). Following housing in early November, all cattle were adapted onto an ad libitum concentrate diet with straw offered as a source of roughage. Cattle remained on ad libitum concentrates for ~200 days before slaughter at under 16 months of age. Friesian bulls were ~50 kg heavier at slaughter than Jersey crossbred bulls and cattle supplemented during the grazing season (PC) were ~45 kg heavier than cattle offered pasture only (PO) (Table 3). Total concentrate supplementation ranged from 2.3 t for Friesians

supplemented during the grazing season to 1.5 t for Jersey crossbreds offered pasture only during the grazing season. Financial results indicated that for systems finishing bulls at under 16 months of age, Jersey crossbreds were more profitable than Friesians and pasture only was more profitable than supplementation during the grazing season. All systems returned a positive gross margin ranging from €70/head for the Friesian system where calves are supplemented in the first grazing season to €194/head for Jersey crossbred systems where calves are not supplemented in the first grazing season. However, when full fixed costs are allocated to these systems, only the latter system (Je PO) returned a positive net margin.

Nineteen and twenty month bull finishing systems

These systems operated similar to the under 16 month bull finishing system up until housing in November at the end of the first grazing season. Thus, two treatments were imposed during the first grazing season; calves supplemented with 2 kg concentrate (PC) and calves receiving pasture only (PO). Following housing, bulls were fed ad libitum grass silage plus 1.5 kg of concentrate until turnout to pasture for a second grazing season in early March. The bulls for finishing at 19 months of age were housed in mid May for a 100 day finishing period on ad libitum concentrates with straw offered as a source of roughage. Similarly bulls to be finished at 22 months were housed approximately 3 months later for a similar 100 day finishing period. Bulls finished at 22 months of age were 70 kg and 90 kg heavier for PC and PO groups, respectively, when compared to bulls finished at 19 months of age (Table 4). Total concentrate intake over the lifetime of the animal ranged from 1.4 t for 19 month finishing bulls which were not supplemented during the first grazing season to 1.8 t for 22 month bulls receiving supplementation during the first grazing season. All systems returned positive gross and net margins with net margin ranging from €150/head to €265/head for 19 month bulls not supplemented in the first grazing season and 22 month bulls supplemented in the first grazing season, respectively. Twenty-two month bull systems were more profitable than 19 month bull systems and systems where concentrate supplementation is provided at pasture during the first grazing season were more profitable than systems where no supplementation was provided during the first grazing season. All systems were highly sensitive to beef price in particular and concentrate price. Again, calf price was also important.

Table 1. *Economics of veal production systems from Friesian (Fr) and Jersey crossbred (Je) calves (€/head)*

	Fr	Je
Calf price (€/head)	140	30
Slaughter weight (kg/head)	275	252
Carcass weight (kg/head)	133	119
Veal price (c/kg)	550	550
Concentrates fed (kg/head)	819	733
Financial performance		
Revenue		
Livestock sales	726	650
Less purchases	147	32
Net income	579	619
Variable costs		
Concentrates	205	184
Milk replacer	46	46
Hay	4	4
Straw	5	5
Veterinary and animal treatments	16	16
Vaccinations and TB test	13	13
Other	26	26
Total	316	295
Gross margin	263	324
Fixed costs		
Car, machinery, insurance, etc.	1	1
Buildings depreciation	64	64
Interest	59	59
Total	124	124
Net margin[1]	139	200
Sensitivity (impact on margin per head)		
Calf price (+/-10 €/head)	10.56	10.47
Finishing concentrate (+/- 10 €/t fresh)	6.48	6.01
Beef price (+/- 10 c/kg):	13.20	11.87
Mortality (per % unit; within range 5 - 30%)	3.24 to 4.05	1.78 to 2.36

[1] *Return to management*

Table 2. *Economics of 12 month bull production systems from Friesian (Fr) and Jersey crossbred (Je) calves (€/head)*

	Fr	Je
Calf price (€/head)	140	30
Slaughter weight (kg/head)	427	363
Carcass weight (kg/head)	217	177
Beef price (c/kg)	350	350
Concentrates fed (kg/head)	1815	1674
Financial performance		
Revenue		
Livestock sales	760	620
Less purchases	147	32
Net income	613	589
Variable costs		
Concentrates	449	414
Milk replacer	46	46
Hay	4	4
Straw	14	12
Vet animal treatments	16	16
Vaccinations and TB test	13	13
Other	26	26
Total	568	532
Gross margin	44	57
Fixed costs		
Car, machinery, insurance, etc.	1	1
Buildings depreciation	84	84
Interest	77	77
Total	161	161
Net margin[1]	-117	-104
Sensitivity (impact on margin per head)		
Calf price (+/-10 €/head)	10.55	10.57
Finishing concentrate (+/- 10 €/t fresh)	17.51	16.11
Beef price (+/- 10 c/kg):	21.68	17.69
Mortality (per % unit; within range 5 - 30%)	3.33 to 4.18	2.05 to 2.52

[1]*Return to management*

Table 3. *Economics of under 16 month bull production systems from Friesian (Fr) and Jersey crossbred (Je) calves receiving concentrate supplementation (PC) or pasture only (PO) during the first grazing season (€/head)*

	Fr PC	Fr PO	Je PC	Je PO
Calf price (€/head)	140	140	30	30
Slaughter weight (kg/head)	501	459	456	408
Carcass weight (kg/head)	265	241	235	211
Beef price (c/kg)	325	325	325	325
Carcass value (€/head)	860	782	763	686
Concentrates fed (kg/head)	2323	1767	2015	1511
Financial performance				
Revenue	860	782	763	686
Livestock sales	147	147	31	31
Less purchases	713	635	731	655
Net income				
Variable costs	574	438	498	375
Concentrates	46	46	46	46
Milk replacer	4	4	4	4
Hay	15	13	12	11
Straw	11	20	10	18
Grazed Grass	20	20	20	20
Veterinary animal treatments	13	13	13	13
Vaccinations and TB test	26	26	26	26
Other	709	580	630	513
Total	4	55	101	141
Gross margin				
Fixed costs				
Car, machinery, insurance, etc.	1	1	1	1
Buildings depreciation	83	83	83	83
Interest	77	77	77	77
Total	161	161	161	161
Net margin[1]	-158	-106	-60	-20
Sensitivity (impact on margin per head)	10.46	10.47	10.53	10.47
Calf price (+/-10 €/head)	22.37	16.81	19.44	14.37
Finishing ration (+/- 10 €/t fresh)	26.50	24.12	23.44	21.14
Beef price (+/- 10 c/kg):	3.06 to	3.04 to	1.96 to	1.82 to
Mortality (per % unit; within range 5 - 30%)	3.92	3.88	2.38	2.32

[1] *Return to management*

Table 4. *Economics of 19 and 22 month bull production systems from calves receiving concentrate supplementation (PC) or pasture only (PO) during the first grazing season (€/head)*

Age of Slaughter	**19 month**		**22 month**	
	PC	PO	PC	PO
Calf price (€/head)	100	100	100	100
Slaughter weight (kg/head)	597	527	668	615
Carcass weight (kg/head)	316	277	357	326
Beef price (c/kg)	350	350	350	350
Concentrates fed (kg/head)	1669	1415	1827	1597
Financial performance				
Revenue				
Livestock sales	1107	969	1250	1142
Less purchases	105	105	105	105
Net income	1002	864	1145	1036
Variable costs				
Concentrates	416	353	455	398
Milk replacer	47	47	47	47
Hay	5	5	5	5
Grazed grass	39	30	73	61
Grass silage	77	58	79	60
Vet animal treatments	21	21	21	21
Vaccinations and TB test	13	13	13	13
Other	26	26	26	26
Total	644	552	718	630
Gross margin	358	312	427	406
Fixed costs				
Car, machinery, insurance, etc.	1	1	1	1
Buildings depreciation	84	84	84	84
Interest	77	77	77	77
Total	162	162	162	162
Net margin[1]	196	150	265	244
Sensitivity (impact on margin per head)				
Calf price (+/-10 €/head)	10.52	10.50	10.54	10.56
Finishing concentrate (+/- 10 €/t fresh)	19.45	18.12	21.78	20.49
Beef price (+/- 10 c/kg):	33.01	30.08	37.53	34.49
Mortality (per % unit; within range 5 - 30%)	3.81 to 4.88	3.68 to 4.77	3.98 to 5.07	3.94 to 4.97

[1]*Return to management*

Table 5. *Economics of 24 month steer production system (€/head)*

Calf price (€/head)	100
Slaughter weight (kg/head)	620
Carcass weight (kg/head)	320
Beef price (c/kg)	350
Concentrates fed (kg/head)	1177
Financial performance	
Revenue	
Livestock sales	1120
Less purchases	105
Net income	1014
Variable costs	
Concentrates	294
Milk replacer	47
Hay	4
Grazed grass	89
Grass silage	165
Vet animal treatments	21
Vaccinations and TB test	13
Other	26
Total	660
Gross margin	355
Fixed costs	
Car, machinery, insurance, etc.	1
Buildings depreciation	84
Interest	77
Total	162
Net margin[1]	193
Sensitivity (impact on margin per head)	
Calf price (+/-10 €/head)	10.52
Finishing concentrate (+/- 10 €/t fresh)	11.04
Beef price (+/- 10 c/kg):	32.01
Mortality (per % unit; within range 5 - 30%)	3.91 to 4.74

[1]*Return to management*

Twenty four month steer finishing systems

In this system Friesian calves are finished for slaughter as steers at 24 months of age. Calves spend their first season at pasture with no supplementation. Following an indoor winter period during which grass silage is offered ad libitum in addition to ~ 1 kg/day concentrate supplementation, yearlings are turned out for a second season at pasture. Cattle are housed in October/ November for a ~150 day finishing period. During the finishing period good quality grass silage was offered in addition to 5-6 kg concentrate daily (Table 5). Target slaughter and carcass weights were 620 kg and 320 kg, respectively. Total concentrate intake was ~1.2 t. Gross and net margins for this system were €355/head and €193/head, respectively. Margins were most sensitive to beef price with concentrate price and calf price assuming similar sensitivity.

Conclusions

All of the systems evaluated in this paper returned positive gross margins indicating that these systems provide a contribution to fixed costs. The 22 month bull finishing system was most profitable with the 24 month steer system next most profitable. The veal production system was also competitive with these systems arising from the much higher price received for veal meat. However, this system is for niche producers with a relatively small market demand. However, for the 12 month and under 16 month systems gross margins were insufficient to cover allocated fixed costs and therefore, these systems returned negative net margins. The exception was the under 16 month Jersey crossbred system where calves were not supplemented during the first grazing season which had a positive net margin. It is apparent that the economics of dairy beef systems are highly sensitive to beef price, concentrate price and calf price and thus, the market outlook is of critical importance when evaluating the profitability of these alternative systems. Thus, it is recommended that detailed enterprise budgets, subject to the prevailing conditions on individual farms and including sensitivity to key parameters, are prepared annually on dairy calf-to-beef enterprises. It should be noted that a constant beef price has been assumed for all scenarios. As the cattle in the Johnstown Castle research project are slaughter, and carcass data becomes available, it will be possible to re-evaluate the economics using the price received for the alternative systems.

Calf rearing management at Johnstown Castle

Emer Kennedy[1], Brendan Swan[2] and Robert Prendiville[3]

[1]Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork; [2]Teagasc, Animal & Grassland Research and Innovation Centre, Johnstown Castle, Wexford; [3]Teagasc, Animal & Grassland Research and Innovation Centre, Teagasc, Grange, Co. Meath (based at Johnstown Castle)

Summary

- Getting the basics right is critical to rear good quality calves.
- Upon arrival on the farm all calves received electrolytes.
- Calves were fed milk once a day from five weeks old and were turned out to grass at six weeks of age.
- Holstein-Friesian calves were weaned >80 kg and Jersey × Holstein-Friesian were weaned > 75 kg
- Average milk replacer input was 34 kg per calf.

Introduction

In 2015 dairy farming will no longer be under the constraints of quota management and it is envisaged that there will be an increase in the national dairy cow herd. This expansion will result in a greater number of male dairy calves on the market giving tremendous potential for beef farmers to diversify into dairy calf to beef systems. However, an efficient calf rearing system is crucial to ensure that these systems of production are financially viable. Calves need to be given the best start possible to ensure that the rearing process is as easy and labour efficient as possible. The key to rearing good quality calves is getting the basics right. While this may take time and effort initially, it should reap dividends in the form of healthier, stronger calves.

Calf management at Johnstown Castle

This year the research demonstration farm reared over 300 calves for the dairy calf to beef trial from 2-3 weeks of age. Upon arrival, irrespective of the distance travelled, all calves were housed according to the groups they arrived in and group fed two litres of electrolytes in compartmentalised feeders. Calves were grouped according to weight and kept indoors until they were 6 weeks of age. The calf housing units were well ventilated and draught free. Straw bedding was used to provide calves with a dry lie. For the first three weeks calves were fed 250 g of milk replacer with two litres of warm water (37°C) morning and evening. The milk feeders were compartmentalised to ensure that each calf received its two litre allocation (Figure 1). Slow, timid drinkers were removed and grouped in a separate pen. From five weeks of age, calves were fed 500 g of milk replacer with three litres of warm water once daily. Coarse calf starter ration, hay and

water were all freely available from arrival.

Calves were turned out to pasture at 6 weeks of age and grouped by age into batches of 45 per group. While at pasture, the feeding regime of 500 g of milk replacer in three litres of warm water was continued and calves were fed using a cafeteria calf feeder (a 50 teat mobile calf feeder; Figure 2). Pre-grazing herbage yields were 800 kg DM/ha and calf ration was freely available. Straw bale shelters on bark mulch were used as windbreakers and provided the calves with a dry lie. Next year roofed shelters will also be made available to the calves outdoors. Calves were weighed every second week from four weeks of age and every week from seven weeks of age and weaned once they had achieved the required weight which was breed dependent (Holstein-Friesian calves >80 kg and Jersey × Holstein-Friesian > 75 kg live weight). Calves were weaned, on average, at 12 weeks of age and average milk replacer input was 34 kg/calf.

Figure 1. *Compartmentalised feeder to ensure that each calf received its allocated amount of milk.*

Figure 2. *A 50-teat calf feeder used for feeding the groups of 45 calves.*

Calf health

The importance of having a healthy calf to begin with cannot be overemphasised. On arrival all calves were tested for bovine viral diarrhoea (BVD) virus and vaccinated for infectious bovine rhinotracheitis (IBR), using an intranasal vaccine and they were also vaccinated against clostridial diseases such as Blackleg. Pneumonia was the most common disease encountered during the rearing period. Calves were treated with antibiotics and anti-inflammatories and were also given electrolytes to prevent dehydration. Isolated incidences of calf scour were also encountered. Calf mortality during the milk feeding period was 2.5 per cent, respiratory problems were diagnosed at the main cause of death. Of course with any calf rearing system hygiene and the minimisation of disease are critical in ensuring a healthy herd. One of the big issues to be mindful of with young calves is scour. Scour, or diarrhoea, is one of the most common conditions seen in young calves, particularly in the first month of life. Many infectious agents such as rotavirus, coronavirus, E. Coli spp. and Cryptosporidium spp. can cause scour, as can nutritional factors. When calves have scour

the capability of the intestine to absorb water is impaired which results in the loss of large amounts of fluid. Consequently the calf quickly dehydrates, electrolytes become unbalanced and energy reserves are depleted. The treatment of scour in calves involves replacing lost body fluids, correcting the electrolyte imbalance, and supplying energy. Thus, it is recommended that milk feeding is continued, as well as offering electrolytes, when the calf has scour. Ideally prevention is better than cure – the following guidelines should be followed in order to help prevent the occurrence of calf scour:

i) Source calves that have been offered sufficient colostrum in a timely manner.

ii) House calves in a draught-free well-ventilated environment. If reared outdoors calves should be provided with adequate shelter from prevailing winds and rain.

iii) Disinfect the calf house regularly (at the least between every batch) and ensure all feeding equipment is thoroughly cleaned after each use. iv) Provide adequate nutrition – especially during cold weather and make sure there are no abrupt diet changes.

v) Quickly identify any calves that develop scour and isolate them from the rest of the group. Clean up any contamination.

vi) If buying in calves, quarantine them for at least 7 days before mixing with other calves.

Harnessing the potential of grass on beef farms

Michael O'Donovan and Deirdre Hennessy

Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork

Summary

- Grazed grass is the cheapest feed on beef farms and offers the most potential to increase profitability.
- Increasing grass utilisation, farm stocking rate and grazing days at grass are the main drivers of increased efficiency.
- Target pre grazing covers of between 1300-1600 kg DM/ha (pre height 8-10 cm) are desirable.
- Mid-season grassland management must focus on offering high levels of green leaf which is the best avenue to increase total grass DM intake.
- Building grass from early August and the use of grass budgeting will increase autumn grass utilisation.
- Planning the autumn closing strategy ensures spring grass availability irrespective of over winter conditions.

How can the potential of grass be harnessed in beef systems?

In the future, the main technical efficiency that be increased on beef farms is the conversion of grass into meat. While we have been used to direct payments in the past two decades, by 2015 we will almost certainly see a reduction in these payments and a move towards higher stocking rate beef systems, something which has been restricted by environmental schemes, etc. in recent years. The main area where the potential of grass can be harnessed on beef farms is by increasing grass utilisation across the main grazing season.

Increasing grass utilisation

Beef farms currently have low stocking rates. The top third National Farm Survey (NFS) cattle farms are stocked at 1.7 livestock units (LU)/ha with the top third of eProfit Monitor cattle farms stocked at 1.95 LU/ha. Nationally cattle farms are stocked at 1.1 LU/ha. Within these stocking rates there is considerable scope to increase the proportion of grass in the grazing animal's diet. While there are a variety of beef systems practised commercially, overall grass utilisation is low national at approximately 4.8 t DM/ha. To begin examining where grass utilisation can be increased, the grazing season must be broken into the three main grazing periods - spring, summer and autumn.

Spring grass utilisation

Early spring grazing has beneficial effects on animal and sward performance. Turning animals out to grass early can substantially reduce the overall concentrate and grass silage feed budget. During the early grazing season (February – April), a balance must be found between feeding animals adequately to sustain high animal performance and conditioning the sward for the late spring/summer grazing season. Generally on beef farms this can be easily achieved by turning out priority stock in early spring.

The clearest path to increasing grass utilisation is to utilise spring grass efficiently. The spring rotation planner can be used effectively to ration grass in spring. The spring rotation planner is available from your local Teagasc advisor or the Teagasc website www.teagasc.ie. There are a number of important benefits to grazing animals in early spring:

- Reduced feed costs
- Reduced labour input
- Reduced slurry accumulation
- Increased animal performance

The key aspect of spring grazing management is to maintain a flexible approach. Priority stock should be turned out to grass first in spring. A number of recent experiments have taken place with differing livestock showing the benefits of spring grazing. At Grange in 2010, a study compared the effect of early turnout of spring calved suckler cows and their calves with a comparative group retained indoors. The study took place from 1 March to 29 March. A number of performance increases were observed for the early turnout group - milk yield per cow increased by 18 per cent, average daily gain (ADG) of the calves increased by 22 per cent during the study, and increased by 6 per cent overall to weaning. The financial benefit of earlier spring grazing was a saving of approximately €1.54/cow/day in feed costs and higher milk yield. The reduced requirement for slurry storage is not factored into this cost saving. This increase in efficiency driven by a simple management practice, could be a key driver of increased production potential across beef farms.

Mid season grazing management

During the main grazing season, the objective is to have an all grass diet and ensure that ADG is close to or in excess of 1 kg/day. From late April onwards grass turns from vegetative (leafy) to reproductive (stemmy). This is an important management issue for grassland farmers. For each 1-unit increase in organic matter digestibility (OMD), grass dry matter intake (GDMI) is increased by 0.20 kg/animal. Increasing herbage allowance results in small increases in GDMI. The aim must be to increase the quality of the

grass allocated rather than the quantity offered; this is achieved by ensuring there is a high quantity of leaf in the sward. The key management objectives during the grazing season is to maintain grass quality while offering the target herbage allowance. The move to grazing lower grass covers of 1300-1700 kg DM/ha, while maintaining a rotation length of 17-21 days has helped the pursuit of increased grass quality in the May to July period. During the mid-season, when a plant starts to head it produces a reproductive stem. This changes the balance of the plant from producing green leaf to producing high stem proportions. Green leaf content is directly related to grass digestibility. A 5.5 per cent change in leaf content is equal to a 1-unit change in digestibility. Poorly managed swards can result in large reductions in green leaf content to just 50 per cent leaf during the reproductive period. Well grazed swards (4.5 – 5 cm post-grazing sward height) will contain a high proportion of leaf. Beef farmers must adopt a policy of offering swards with high leaf content throughout the season.

Main season grazing management can be difficult when stocking rates are low on farms and the easiest way of rectifying this is to increase the carrying capacity of the farm with extra stock. The tendency on all livestock farms is to graze high pregrazing yields throughout the main grazing season, but this is not the correct way forward to ensure high performance. In the last two years the adoption of the wedge based technology, whereby the target pre-grazing herbage mass is set at 1300-1700 kg DM/ha, has been adopted on dairy farms and should be used also in beef farm grazing management. Allocating grazing cows swards of approximately 1500 kg DM/ha strikes the correct balance between animal performance and grazing management efficiency. A previous study showed that when the policy of continually targeting lower pre-grazing herbage masses is adopted, then it is possible to quickly run into grass deficits across the grazing season.

Autumn grazing management

As in spring, the focus of autumn grazing management is to increase days at grass and increase animal performance, it is also necessary to set the farm up on the final rotation to grow grass over the winter and provide grass the following spring. There are two key periods in autumn: (i) the period of autumn grass build up and (ii) managing the final rotation. Generally rotation length should be extended from 10 August. The focus of this period is to gradually build pre-grazing herbage mass, targeting covers of 2000- 2300 kg DM/ha in mid-September. Pre-gazing covers >2500 kg DM/ha are difficult to utilise and should be harvested as surplus (round bales). Removing paddocks after the first week of September should be avoided if possible. Such paddocks have only one rotation left for grazing at that stage. Removing these paddocks

in September is too late as there will be inadaquate regrowth to make any meaningful contribution in the last rotation. Surplus paddocks should be removed in August. Decisions can be easily made if the farm cover targets are achieved at the right time. Many farmers fall into the trap of building cover too late and are pushed into harvesting excess grass in September.

Key points for autumn grazing management;

- Build rotation length from 10 August, increasing rotation length from 28 days to 35 days in mid-September.
- Highest farm cover should be achieved in mid to late September.
- The first paddock required for spring grazing should be closed on 10 October, in slower grass growing regions closing may begin earlier. Sixty per cent of the herbage available for grazing next spring will be the grown once these paddocks have been closed.
- Each 1 day delay in closing from 10 October to 11 December reduces spring herbage mass by 15 kg DM/ha/day.
- Have at least 60 per cent of the farm closed by the end of the first week of November.
- All paddocks should be grazed to a post-grazing height of 4 cm during the last rotation to encourage winter tillering.

Conclusion

The competitive advantage for Irish beef production in the coming decades will depend on increased and more efficient utilisation of grass for the sustainable production of high quality meat. The proportion of annual feed intake contributed by grazed herbage will have to increase to the highest amount practical. This will require the widespread adoption of best practise grassland and grazing management techniques. A stronger focus on increasing grass utilisation throughout the grazing season will need to take place on beef farms, the key periods to increase grass utilisation are in early spring and late autumn. The beef industry has huge potential to deliver a substantial increase in grass utilisation.

Dawn Meats 2011 calf rearing project

Sarah Long
Group Agriculture Manager – Dawn Meats Group

Summary

- Over 1000 calves reared under the Dawn Meats system.
- Early vaccination and BVD testing essential.
- Attention to detail on calf health important.
- Mortality rate in the Dawn Meats rearing facility was 1.3 per cent.

Introduction

Irish dairy industry trends show a significant increase in the dairy herd over the next few years which will ultimately result in more dairy bred bull calves on the market. This, in tandem with the reduction in the suckler herd over the past few years, challenges the beef sector to utilise dairy bred calves to fill a gap in the beef market.

Rising to the challenge, Dawn Meats engaged with Teagasc back in 2010 to evaluate different bull beef finishing systems for dairy bred calves. Alongside this Dawn Meats embarked on their own project to rear calves in 2011. The importance of giving the calf a good start in life and attention to detail during the calf rearing period cannot be overemphasised. When these Dawn Meats reared calves were weaned, the animals were placed with specialised finishers. Targets were set for both links in the chain to ensure an end product which will meet a number of specific market requirements and ultimately maximise the dairy bulls' market value.

Calf rearing project overview

Dawn Meats worked closely with five specialised calf rearers who reared 842 calves. Holstein Friesian bull calves were sourced from various outlets, including direct from dairy farms, live exporters collection centres and dairy producer groups. No Jersey crossbreds were included in this project.

Targets were set for the calves on arrival at the units but the methods for rearing the calves were left in the hands of the rearers to allow Dawn Meats to assess whether there was any significant difference in the processes used.

Calves had to meet a specification of 50 kg at two weeks of age before being allowed onto any unit and reach a target of 110 kg at 12 weeks before moving onto the finishing units.

Rearers used four different milk powders (both once a day and twice a day feeding), three different feeding systems (teat systems and trough based

systems) and 4 different feed rations (compound pellets and mixed rations) in the process but no differences were found in any methods used.

A total of 740 of the calves were born in late January early February, with 102 calves being born in March and April. This allowed Dawn Meats to establish the positive or negative effects of rearing later born calves.

Calves were vaccinated for IBR, PSV and PI3 and also tested for BVD. Any BVD persistently infected animals (PI's) were culled from the herd.

Overall mortality, excluding BVD PI's, for the project throughout the rearing stage was 1.3 per cent.

Table 1: *Mortality during the rearing period (not including BVD PI's)*

Farm	**A**	**B**	**C**	**D**	**E**
Total reared	195	106	203	140	198
Total lost	6	2	1	2	0
Mortality per cent	3	1.8	0.5	1.4	0

One rearing unit experienced a high cost for veterinary medicines which were attributed to a combination of factors. The rearing shed was very large and took a period of three weeks to fill, creating problems with disease spread during the first five weeks. The same unit also had two calves test positive for BVD which were not identified until near the end of the rearing period and, although not confirmed, were suspected of causing additional health problems within the shed.

The results of the BVD test to date show the rate of PI animals as 0.76 per cent, with 48 results still to be received.

In addition to the calf rearers working directly with Dawn Meats, another two rearers sourced calves themselves, worked to the Dawn Meats specification and reared 250 calves. These animals have been moved to Dawn Meats finishers and will be finished alongside the original 831 calves bringing the total to 1,081. All of these animals will be being finished to the under 16 month specification.

There are currently six finishers working to a specification for under 16 months bulls, O=2= grade and minimum 270 kg carcass weight. Dawn Meats are monitoring the growth of these cattle throughout the finishing period. These animals are due for slaughter in May/ June 2012.

Conclusion

The specification for the calves going into rear was critical to the success of the rearing period and subsequent mortality rates.

The rearing system was not critical to achieving target weights but attention to detail and general husbandry was essential.

Vaccination of the calves at an early stage is essential and BVD testing as early as possible is crucial not just for the herd but in minimising the incidence of this debilitating disease on a national level.

Animal & Grassland Research and Innovation Programme
Moorepark,
Fermoy,
Co. Cork
Tel : 025-42222

www.teagasc.ie

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